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(54) Airbag cover and apparatus for producing an invisible tear seam therein

Airbag-Abdeckung und Vorrichtung zur Herstellung einer unsichtbaren Bruchlinie daran

Revêtement pour poche d'air et appareil pour fabriquer une ligne de rupture invisible dans ce revêtement

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• Iannazzi, Peter
Hampton, New Hampshire 03842 (US)

(30) Priority: 28.09.1992 US 951874

(74) Representative: Hands, Horace Geoffrey et al
GEORGE FUERY & CO
Whitehall Chambers
23 Colmore Row
Birmingham B3 2BL (GB)

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(73) Proprietor: Textron Automotive Interiors Inc.
Troy, Michigan (US)

(72) Inventors:

• Parker, Thomas
Strafford, New Hampshire 03884 (US)

Forming durch nacheinander
Aufschmelzen verschiedener
Thermoplaste in einer
speziell geformten
Süßform

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EP 0 590 779 B1

Description**BACKGROUND OF THE INVENTION****1. Technical Field**

This invention relates to covers for air bag units located within the interior of a motor vehicle and in particular relates to covers having a tear seam therein that is configured to define an uninterrupted outer surface on the cover. Further, the invention relates to apparatus and a method for forming hidden tear seams in such covers for air bag units.

2. Description of the Related Art

Various proposals for covering air bag units have evolved. One primary objective is to provide a cover that has a weakened section therein that will separate upon air bag deployment to provide an opening in the cover through which the air bag can escape following vehicle impact that is sensed by a controller. A gas generator is ignited by the controller to produce gas for inflating the air bag as it is deployed.

Air bags are mounted in canisters that can be mounted in the steering wheel or in an instrument panel or crash pad on the driver's side of the vehicle. If the air bag is mounted on the passenger side, typically the canister is stowed behind an instrument panel either in a top mount position or in front mount position. Such mounting arrangements require that the cover material of the steering wheel hub or the skin or cover of the instrument panel be specially configured during manufacture to produce a weakened section to define a seam therein that will readily open during bag deployment.

Such manufacturing methods and resultant structure must consider various functional and aesthetic requirements. The seam must be configured to separate such the air bag can be deployed immediately after vehicle impact. However, the cover must have a seam that is configured such that the air bag unit is protected against either accidental or intentional tampering and additionally the seam should be configured to meet long term weathering and interior design appearance requirements. As to design appearance, there is a desire in some cases to form the surface of the cover as a smooth uninterrupted surface so that there is no indication that there is a air bag unit disposed beneath the surface. This interior design objective is desired both from a human psychology standpoint and from a pure esthetics standpoint. In the case of the psychological considerations, the smooth surface effectively meets the adage of out of sight out of mind such that a passenger is not reminded of the possibility of deployment of an air bag unit. The interior design consideration enables smooth flowing surfaces to be incorporated in the cover material of an instrument panel on the passenger side thereof.

United States Patent No. 3,640,546, issued Febru-

ary 1, 1972 to D.S. Brawn, includes a cover for a air bag unit having two doors that are covered by an outer layer of material that is weakened along a joint line by reducing the thickness of the outer layer. Such thin sectioned seam lines can cause a resultant depression over time that will essentially outline the outlet from the canister for the air bag component of the air bag unit. The arrangement does not solve either the psychological awareness problem or the problem of retaining a smooth, flowing surface appearance.

United States Patent No. 4,246,213, issued January 20, 1981 to Y. Takamatsu et al., discloses a method for casting a V-shaped section at the tear seam. While the outer surface of the cover material is smooth the V-shaped configuration also reduces the thickness of the outer layer in an undesirable manner.

United States Patent No. 5,082,310 discloses a cover for an air bag unit. The cover includes two doors that are hinged for pivotal movement during air bag deployment. The doors are covered by a layer of foam and the layer of foam is covered by an outer skin having a V-shape groove that is cut to weaken the skin.

One problem common to designs that cut or score a tear seam into an outer skin is that plastic materials especially, at cold temperatures, are prone to becoming brittle such that the cut or score line can induce cracking along the seam. At opposite temperature extremes typical skin cover material such as thermoplastic olefins or thermoplastic polyvinyl chloride become relatively soft and deformable such that they will stretch and remain unbroken during initial bag deployment. Another problem that can arise with cut or scored tear seams is that they become observable (read through outer surface) following extended periods of exposure to heat and sunlight.

Another specific disadvantage of the cover shown in the '310 patent and another cover shown in United States Patent No. 4,886,630 is that they require that the outer skin be separately formed on a heated mold and then removed from the mold and cut before being co-molded to a foam layer in a subsequent molding operation.

The problems arising from separately forming a skin and then cutting the grooves therein are obviated by the present method that employs casting techniques disclosed in United States Patent Nos 4,623,503, issued November 18, 1986 to E Anetis et al 4,562,025, issued December 31, 1985 to John D Gray and 4,925,151 issued May 15, 1990 to John D Gray all of which are commonly assigned to the assignee of the present invention.

The invention is defined in the appended claims.

The invention is further described in the following detailed description with reference to the accompanying drawings wherein:-

FIGURE 1 is a perspective view of an automobile interior trim structure incorporating a tear seam;

FIGURE 2 is a cross-sectional view taken along the line 2-2 of Figure 1 looking in the direction of the arrows;

FIGURE 3 is an enlarged cross-sectional view of the structure of Figure 2 showing the detail of a pre-formed opening and filler strip components thereof;

FIGURE 4 is partial perspective view of an instrument panel mounted within an automobile interior compartment and showing in hidden lines a tear seam of the present invention overlying an air bag deployment cover;

Figure 5 is a partial perspective view of the instrument panel of Figure 4 with the air bag deployment cover in an open position and with the tear seams therein separated;

Figure 6 is a fragmentary top elevational view of the shell tool following casting of a first thermoplastic material around the gasket footprint and following separation of the shell tool from the powder box and tear seam pattern gasket and showing a cast skin or shell having a preformed opening thereon corresponding to a desired tear seam configuration;

Figure 7 is a diagrammatic view of a shell tool and powder box apparatus of the present invention having a tear seam pattern with gasket thereon;

Figure 8 is a diagrammatic view showing the pre-formed opening being filled while the skin remains in the shell tool;

Figure 9 is a fragmentary sectional view of apparatus used in practicing another embodiment of the method of this invention in forming another embodiment of an outer skin for the cover assembly of the present invention as shown in Figure 10; and

FIGURE 10 is a fragmentary perspective view of the embodiment of the outer skin formed by the apparatus and method of Figure 9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with a preferred embodiment of the invention in Figure 6 an apparatus 10 is illustrated for manufacturing the outer skin and air bag deployment cover assembly of the present invention. The apparatus 10 includes a powder box 12 having a peripheral portion 14 adapted to be connected to the peripheral portion 16 of a thin shell mold or shell tool 18 by suitable clamps that join the peripheral portions in a known manner.

The powder box 12 has a gasket carriage 20 of the tear seam pattern 58 fixedly connected thereto that includes two cross legs 22, 24 and a centre portion 26 that form an H-shaped pattern. Each of the legs 22, 24

and the centre portion extend beyond the depth of the powder box and outwardly of the peripheral portion 14 of the powder box such that they will generate into the interior of the shell tool 18 when the powder box 12 is clamped to the shell tool 18. Each of the legs 22, 24 and centre portion 26 have a gasket mounting surface 28 thereon on which is affixed a gasket 30.

The gasket 30 is shown as an H-shaped configuration and is conformable to a flat surface region 32 on the inner surface 34 of the shell tool 18 such that it will bridge the distance between the mounting surface 28 and the flat surface region 32 and form a sealed footprint on the flat surface region 32. The gasket 30 can, of course, have any shape desired so long as it corresponds to the tear seam pattern.

The gasket has a hollow section that is a greater depth when at rest than when engaged with the sealable portion of the inner surface of the mold shell. The gasket is compressible when so engaged.

The process for manufacturing the outer skin and cover assembly of the present invention includes initially locating the shell tool 18 in an inverted position as shown in Figure 6 such that the inner surface 34 faces downwardly. The shell tool 18 is mated to the powder box 12 that contains a powdered thermoplastic material. When the peripheral portions 14, 16 are connected the shell tool 18 and powder box 12 form a sealed mold chamber 36 defined by the inner surface 324 and the interior walls of the powder box 12. The thermoplastic material can be a dry resin powder material with suitable coloring and plasticize content, such as described in U.S Patent No. 4,923,657 issued May 8, 1990 to J.C. Gembinski et al. Shell tool is heated to a sufficient temperature to cause approximately one millimeter of dry powder to attach and fuse. Mold apparatus 10 is then rotated as a unit 180 degrees to dump the dry powder against the surface 34. Since the inner surface is heated, a layer of the dry powder forms across the surface 34 and about the outer peripheral edge 30a of the gasket 30 and fuses to form a skin 40 of plastic with an H-shaped gap or opening 40a therein at the foot print of the gasket 30. The remaining powder is dumped back into the powder box by rotating the mold apparatus 10 as a unit back to the initial position shown in Figure 6. The powder box 12 and shell tool 18 are then disconnected and the shell tool 18 is heated more to cure the thermoplastic layer. Thereafter a second type of thermoplastic material is deposited within the H-shaped gap or opening 40a while the skin 40 is in the shell tool 10 (FIG. 8). The shell tool 10 is heated to suitably cure both the originally deposited material that makes up the skin 40 and the second deposited material that makes up a filler strip 40b that fills the gap 40a. Finally, the shell tool 10 is cooled and the skin 40 and H-configured filler strip formed integrally therewith are removed as a unit from the inner surface 34.

Automated production apparatuses for performing such steps are well known to those skilled in the art including United States Patent Nos. 4,623,503, issued

November 18, 1986 to E. Anetis et al., 4,562,025, issued December 31, 1985 to John D. Gray and 4,925,151 issued May 15, 1990 to John D. Gray. The manner of heating the shell tool 18 will depend upon a particular operation but it is contemplated that heating by directing a heated air stream on the outer surface 18a of the shell tool 18 will work. The gasket 30 cross-section can be a foam compressible material such as a temperature resistant foam or it can be a hollow gasket either of the inflatable or non-inflatable type such as is shown in 4,925,151 issued May 15, 1990 to John D. Gray.

Figures 1-5 show an automobile interior trim structure 50 that includes a cover assembly 52 for hiding an air bag unit 54 shown in outline broken line form in Figure 2. In Figure 1 an outer skin 56 is shown having a H-shaped filler strip 58 therein of an integrally molded thermoplastic material having a lesser tensile strength than that of surrounding thermoplastic material of the outer skin 56. The cover assembly 52 has a smooth uninterrupted outer surface 60 that extends across the filler strip 58. Since the filler strip 58 is formed from a different type material than the remainder of the outer skin 56, in order to provide an identical surface appearance a thin paint coating 62 can be provided on the outer surface 60. Alternatively, the filler strip material and skin material can be blended to provide an identical appearance match. In the illustrated embodiment the cover assembly 52 includes a pair of doors 64, 66 formed as part of an insert 68 that forms an enclosure for an air bag canister 70 having a deployable air bag 72 therein. The air bag 72 is inflated by a gas generator 74 upon ignition in response to a signal from a controller 76 including collision sensing device 76a as is well known in the art. The configuration of the air bag unit and the arrangement of the components thereof will depend upon a particular application and form no part of the present invention. Furthermore, the cover assembly 52 can be formed to have a single door or other configuration that will spread open to bear against the outer skin 56 so as to cause separation thereof at the filler strip 58 that defines a lesser strength region in the outer skin 56 that will immediately separate upon air bag deployment. In the illustrated embodiment, the filler strip 58 forms an H-shaped tear seam within the outer skin 56. The doors 64, 66 will pivot about hinges 64a, 66a as shown in Figure 3 to press through a foam layer 78 located between the insert 68 and the outer skin 56. The doors 64, 66 will act on the lesser strength region defined by the filler strip 58 to produce an immediate separation of the outer skin 56 to form an opening 80 as shown in Figure 5 such that the air bag 72 will be free to deploy into the passenger compartment immediately following a collision that will ignite the gas generator 74 and inflate the air bag 72 for deployment through the opening 80 formed by the separation of the H-shaped tear seam.

In accordance with the invention the H-shaped tear seam has a surface smoothness like that of the surrounding regions of the outer skin such that the cover

assembly 52 will appear as a continuous uninterrupted surface overlying the outlet from the canister that houses the air bag. It will of course be understood that the filler strip 58 that forms the lesser strength material region within the outer skin 56 can be shaped in other ways including C, U or X shapes as illustrated in co-pending United States Patent Application Serial No. 680,837 filed April 5, 1991 and commonly assigned with the present application. In one embodiment, the material of lesser strength is a spray deposited highly glass filled or carbonate or other filler filled thermoplastic PVC or polyolefin material and the surrounding material of the outer skin 56 is a thermoplastic material formed from PVC. The lesser strength material that forms the filler strip 58 has a lower tensile and elongation property in the operational temperature range than that of the material comprising the remainder of the outer skin that is integrally bonded to and in surrounding relationship to the periphery of the filler strip 58. Typically, the operational temperature range in an instrument panel can range from -30°C to 104°C.

The outer skin 56 provides a tear seam at the filler strip 58 that has the necessary thickness to hide any tendency to read through the location of the doors or the outlet from the canister. Nevertheless, the filler strip 58 defines a tear seam that will provide an weak link at which the outer skin 56 will be easily separated.

In some cases, the need for a hidden seam line is less critical. If so, the method will include providing a nickel alloy mold shell 82 having a styling line protrusion 84 therein. As shown in Figure 9, the sealing gasket 86 is positioned over the protrusion 84 to form a sealed footprint corresponding to a desired tear seam pattern. The first thermoplastic material is cast as layer 90. The gasket 86 is removed and a preformed opening 88 in layer 90 is then filled by casting, spraying or otherwise depositing a second layer of thermoplastic material of desired, different properties than of the first material. A resultant recessed styling filler strip 92 is formed on the layer 90 as shown in Figure 10.

It will be appreciated from the foregoing description that the present invention not only includes an outer skin configuration that will assure cover assembly opening immediately upon vehicle collision but additionally a outer skin configuration that will hide an underlying air bag unit over long periods of time. Furthermore, the arrangement will protect an underlying air bag unit against either accidental or intentional tampering since there is no structure or door that can be pried open or inadvertently depressed into the structure of the air bag unit. It will be further appreciated by those skilled in the art that the foregoing description is for a preferred exemplary embodiment of the invention and that the invention is not limited to the specific embodiments or material selections shown or discussed. For instance, in the broader aspect of the outer skin, the seam forming gap can be filled with a suitable bonding material with desired tensile strength properties so long as the gasket formed gap therein is filled to form a smooth outer sur-

face and a thickness of material that will prevent read through of underlying air bag unit components. For instance, in the broader aspect of the apparatus the gasket can be carried by a separate carriage apart from a powder box such that the initial skin can be formed around a gasket footprint by spray deposit of the thermoplastic material rather than rotational coating of the thermoplastic powder. For instance, in the broader aspect of the method, the initial coating with the pre-formed opening can be formed by an injection molding or a spray step and the filling of the preformed opening can be accomplished by a rotational deposition of thermoplastic material of lesser strength and lesser elongation under operating temperature conditions. In addition to thermoplastic PVC spray coatings, the method of the invention contemplates the use of spray coating urethane materials to either form the preformed opening in the skin or shell or to form the filler strip.

Claims

1. A method for forming an outer skin (40) for a cover assembly (52) for an air bag unit (54) the outer skin having a tear seam (58) formed therein corresponding to the general shape of a door or doors (64,66) covering the outlet from a canister (70) for the air bag in the air bag unit the method comprising:
 - (a) providing a mold shell (18) with an inner surface portion (34),
 - (b) providing a gasket (30) having a shape that corresponds to the shape of the tear seam (58) to be provided in the outer skin (40);
 - (c) locating the gasket (30) in sealed contact with said inner surface portion (34) to form a sealed footprint having a shape conforming to that of the tear seam (58);
 - (d) depositing a first thermoplastic material (40) in the mold surface and against the periphery of the gasket when it is located in sealed contact with the inner surface and heating the first thermoplastic material to form an outer skin around the gasket;
 - (e) removing the gasket from the outer skin to form a preformed opening therein and there-through corresponding to the shape of the tear seam; and
 - (f) filling the preformed opening in the outer skin with a material (40b) having different properties than the outer skin.
2. A method for forming an outer skin (40) for a cover assembly (52) for an air bag unit (54) the outer skin having a tear seam (58) formed therein correspond-

ing to the general shape of a door or doors (64,66) covering the outlet from a canister (70) for the air bag in the air bag unit, the method comprising:

- 5 forming a preformed opening (40a) corresponding to a tear seam (58) pattern in an outer skin (40) of a first thermoplastic material; and
- 10 filling the preformed opening with a second thermoplastic material (40b) having different properties than those of the first material.
- 15 3. The method of Claim 1, further comprising a filling step (f) wherein the filling includes filling the preformed opening (58) to form a smooth uninterrupted surface across the outer skin at a hidden seam line therein defined by the second thermoplastics material (40b).
- 20 4. The method of Claim 1, further comprising filling the preformed opening by spray coating a filled thermoplastics material therein.
- 25 5. The method of Claim 4, further comprising filling the preformed opening by spray coating a glass filled PVC material therein.
- 30 6. The method of Claim 4, further comprising filling the preformed opening by spray coating a carbonate filled PVC material therein.
- 35 7. The method of Claim 2, further comprising a filling step (f) wherein the filling includes filling the opening to form a smooth uninterrupted surface across the outer skin at a hidden seam line.
- 40 8. The method of Claim 2, further comprising filling the opening by spray coating a filled thermoplastic material therein.
- 45 9. The method of Claim 4, further comprising filling the opening by spray coating a glass filled PVC material therein.
- 50 10. The method of Claim 4, further comprising filling the opening by spray coating a carbonate filled PVC material therein.
- 55 11. A mold assembly for forming an outer skin (40) for a cover assembly (52) for an air bag unit (54), the outer skin having a tear seam (58) formed integrally thereof corresponding to the general shape of a door or doors (64,66) covering the outlet from a canister (70) for the air bag in the air bag unit the mold comprising:

a thin shell mold 18 having an inner surface (34) upon which the outer skin (40) is to be

formed and an outer surface and a sealable portion on said inner surface;

a gasket (30) having a surface thereon corresponding generally to the shape of the tear seam (54); and

a gasket carriage (20) selectively moveable with respect to said inner surface for compressing said gasket against the sealable portion of said inner surface to form a sealed gasket footprint on said inner surface corresponding to the shape of the outlet from the canister.

12. The mold assembly of Claim 11, further comprising a powder box (12) adapted to be connected to said thin shell mold and including an inner surface that combines with the inner surface of said thin shell mold to form a sealed chamber; said gasket carriage (20) fixedly connected to said powder box and extending outwardly thereof and inwardly of said thin hollow shell to a point in close spaced relationship to said sealable portion of said inner surface of said thin shell mold; said gasket (30) connected to said gasket carriage to bridge between said powder box and said sealable portion of said inner surface to form a sealed footprint thereon.
13. The mold assembly of Claim 11, further comprising a gasket (30) that has a hollow section thereof that is of greater depth when at rest than when engaged with said sealable portion of said inner surface (32).
14. The mold assembly of Claim 12, further comprising a gasket (30) that is compressible when engaged with said inner surface following connection of said powder box (12) to said sealable portion of said thin shell mold.
15. The mold assembly of Claim 14, further comprising a gasket (30) that has a hollow section thereof that is greater depth when at rest than when engaged with said sealable portion of said inner surface.
16. A cover assembly (52) for an air bag unit (54) deployable into the passenger compartment of a motor vehicle through an opening in the cover assembly at a separable hidden tear seam (58) in the cover assembly the improvement comprising:-

an outer skin (40) having a smooth outer surface;

means (58) forming a preformed opening in said outer skin; said preformed opening having a thickness corresponding to the thickness of the remainder of the outer skin and having a shape conforming to the outlet from the air bag unit;

and a filler strip (40b) within said preformed opening integrally bonded to said outer skin (40) and having an outer surface that joins to the outer surface of the outer skin to form a smooth uninterrupted outer surface extending across all of the outer skin whereby there is no readout of the presence of a air bag unit beneath the outer skin; said filler strip being weaker than the remainder of said outer skin whereby it will immediately separate to form an opening upon deployment of the air bag from the air bag unit.

17. The cover assembly of Claim 16, further comprising:
a filler strip (40b) of a thermoplastic material in said preformed opening and said filler strip integrally molded with the remainder of the outer skin (40a).
 18. The cover assembly of Claim 16, further comprising:
a filler strip of thermoplastic material that fills the preformed opening; said filler strip of thermoplastic material having a lesser tensile strength than said outer skin.
 19. The cover assembly of Claim 16, further comprising:
said outer skin comprised of a first cast thermoplastic material and said filler strip comprised of a second thermoplastic outer skin that fills the preformed opening to form a smooth uninterrupted outer surface overlying the air bag unit.
 20. The cover assembly of Claim 19, further comprising a filler strip comprised of material selected from the group including glass filled polyvinyl chloride or glass filled polyolefins.
 21. The cover assembly of Claim 20, further comprising a filler strip comprised of material selected from the group including carbonate filled polyvinyl chloride or glass filled polyolefins.
- 50 Patentansprüche
1. Verfahren zur Herstellung eines Außenüberzugs (40) einer Abdeckungsanordnung (52) für eine Airbag-Einheit (54), wobei im Außenüberzug eine Bruchlinie (58) ausgebildet ist, die im wesentlichen der Form einer oder mehrerer Klappen (64, 66) entspricht, welche den Auslaß eines Behälters (70) für den Airbag in der Airbag-Einheit bedecken, wobei das Verfahren die folgenden Arbeitsschritte umfaßt:

- a) Bereitstellen einer Überzugsform (18) mit einem Innenflächenabschnitt (34);
- b) Bereitstellen eines Einsatzes (30), dessen Form der Form der im Außenüberzug (40) herzustellenden Bruchlinie (58) entspricht; 5
- c) Ausrichten des Einsatzes (30) in dichtendem Kontakt mit dem Innenflächenabschnitt (34) zur Herstellung eines dicht abgedeckten Musters, dessen Form der Form der Bruchlinie (58) entspricht; 10
- d) Aufbringen eines ersten thermoplastischen Materials (40) in die Fläche der Überzugsform und an den Rand des Einsatzes, sobald dieser in abdichtendem Kontakt mit der Innenfläche steht, und Erhitzen des ersten thermoplastischen Materials zur Ausformung eines Außenüberzugs rund um den Einsatz; 15
- e) Entfernen des Einsatzes vom Außenüberzug zur Herstellung einer vorgeformten Aussparung im und durch den Überzug, deren Form der der Bruchlinie entspricht; und 20
- f) Auffüllen der vorgeformten Aussparung im Außenüberzug mit einem Material (40b), das andere Eigenschaften aufweist als der Außenüberzug.
2. Verfahren zur Herstellung eines Außenüberzugs (40) einer Abdeckungsanordnung (52) für eine Airbag-Einheit (54), wobei im Außenüberzug eine Bruchlinie (58) ausgebildet ist, die im wesentlichen der Form einer oder mehrerer Klappen (64, 66) entspricht, welche den Auslaß eines Behälters (70) für den Airbag in der Airbag-Einheit bedecken, wobei das Verfahren die folgenden Arbeitsschritte umfaßt: 25
- Herstellen einer dem Muster der Bruchlinie (58) entsprechenden vorgeformten Aussparung (40a) in einem aus einem ersten thermoplastischen Material bestehenden Außenüberzug (40); und 30
 - Auffüllen der vorgeformten Aussparung mit einem zweiten thermoplastischen Material (40b), welches anderen Eigenschaften aufweist als das erste thermoplastische Material.
3. Verfahren nach Anspruch 1, weiterhin umfassend einen Auffüllschritt (f), wobei die vorgeformte Aussparung (58) derart aufgefüllt wird, daß eine glatte, durchgehende Oberfläche auf dem Außenüberzug an einer darin verborgenen, aus dem zweiten thermoplastischen Material (40b) gebildeten Bruchlinie entsteht.
4. Verfahren nach Anspruch 1, weiterhin umfassend ein Auffüllen der vorgeformten Aussparung durch Einsprühen eines thermoplastischen Materials, in das ein Füllmaterial eingelagert wurde, in die Aussparung.
5. Verfahren nach Anspruch 4, weiterhin umfassend ein Auffüllen der vorgeformten Aussparung durch Einsprühen eines PVC-Materials, in das Glasfasern eingelagert wurden, in die Aussparung.
6. Verfahren nach Anspruch 4, weiterhin umfassend ein Auffüllen der vorgeformten Aussparung durch Einsprühen eines PVC-Materials, in das Karbonat eingelagert wurde, in die Aussparung.
7. Verfahren nach Anspruch 2, weiterhin umfassend einen Auffüllschritt (f), wobei die Aussparung derart aufgefüllt wird, daß auf dem Außenüberzug über einer verborgenen Bruchlinie eine glatte, durchgehende Oberfläche entsteht.
8. Verfahren nach Anspruch 2, weiterhin umfassend ein Auffüllen der Aussparung durch Einsprühen eines thermoplastischen Materials, in das ein Füllmaterial eingelagert wurde, in die Aussparung.
9. Verfahren nach Anspruch 4, weiterhin umfassend ein Auffüllen der Aussparung durch Einsprühen eines PVC-Materials, in das Glasfasern eingelagert wurden, in die Aussparung.
10. Verfahren nach Anspruch 4, weiterhin umfassend ein Auffüllen der Aussparung durch Einsprühen eines PVC-Materials, in das Karbonat eingelagert wurde, in die Aussparung.
11. Formanordnung zur Ausformung eines Außenüberzugs (40) einer Abdeckungsanordnung (52) für eine Airbag-Einheit (54), wobei im Außenüberzug integral eine Bruchlinie (58) ausgebildet ist, die im wesentlichen der Form einer oder mehrerer Klappen (64, 66) entspricht, welche den Auslaß eines Behälters (70) für den Airbag in der Airbag-Einheit bedecken, enthaltend
- eine dünne, schalenförmige Überzugsform 18 mit einer Innenfläche (34), auf der der Außenüberzug (40) ausgeformt wird, wobei die Innenfläche eine äußere Oberfläche und einen Abschnitt aufweist, der dicht abgedeckt werden soll;
 - einen Einsatz (30) mit einer Oberfläche, deren Form im wesentlichen der der Bruchlinie (54) entspricht; sowie
 - einen Einsatzträger (20), der relativ zur Innenfläche wie gewünscht bewegt werden kann, um

den Einsatz gegen den abzudichtenden Bereich der Innenfläche zu drücken und so ein dicht abgedecktes Muster auf der Innenfläche herzustellen, das der Form des Auslasses des Behälters entspricht.

12. Formanordnung nach Anspruch 11, weiterhin enthaltend einen Pulverbehälter (12), der so ausgebildet ist, daß er mit der dünnen Überzugsform verbunden werden kann, und der eine Innenfläche aufweist, die mit der Innenfläche der dünnen Überzugsform so zusammenpaßt, daß eine abgedichtete Kammer entsteht; wobei der Einsatzträger (20) fest mit dem Pulverbehälter verbunden ist und sich aus ihm hinaus in die dünne, hohle, schalenförmige Überzugsform hinein bis zu einem Punkt erstreckt, der nahe dem abzudeckenden Bereich der Innenfläche der dünnen Überzugsform liegt; wobei der Einsatz (30) mit dem Einsatzträger so verbunden wird, daß er den Zwischenraum zwischen dem Pulverbehälter und dem dicht abzudeckenden Bereich der Innenwand ausfüllt und so ein Muster darauf dichtend abdeckt.

13. Formanordnung nach Anspruch 11, weiterhin enthaltend einen Einsatz (30), der einen hohlen Bereich aufweist, welcher im Normalzustand eine größere Tiefe besitzt als wenn er am dicht abzudeckenden Bereich der Innenfläche (34) anliegt.

14. Formanordnung nach Anspruch 12, weiterhin enthaltend einen Einsatz (30), der zusammengedrückt werden kann, wenn er an der Innenfläche anliegt, nachdem der Pulverbehälter (12) mit dem abzudeckenden Bereich der dünnen Überzugsform verbunden wurde.

15. Formanordnung nach Anspruch 14, weiterhin umfassend einen Einsatz (30), der einen hohlen Bereich aufweist, welcher im Normalzustand eine größere Tiefe besitzt als wenn er am abzudeckenden Bereich der Innenfläche (34) anliegt.

16. Abdeckungsanordnung (52) für eine Airbag-Einheit, wobei sich die Airbag-Einheit durch eine an einer aufreißbaren, verborgenen Bruchlinie (58) in der Abdeckungsanordnung entstehenden Öffnung in der Abdeckungsanordnung in den Fahrgastrraum eines Kraftfahrzeugs hinein entfalten kann, gekennzeichnet durch folgende Bestandteile:

- einen Außenüberzug (40) mit einer glatten Außenfläche;
- Mittel (58), die eine vorgeformte Aussparung im Außenüberzug ausbilden, wobei die vorgeformte Aussparung eine Dicke besitzt, die der Dicke des übrigen Außenüberzugs entspricht, und eine Form, die dem Auslaß der Airbag-Einheit entspricht;

heit entspricht;

sowie einen Füllstreifen (40b) innerhalb der vorgeformten Aussparung, welcher integral mit dem Außenüberzug (40) verbunden ist und eine äußere Oberfläche aufweist, die mit der äußeren Oberfläche des Außenüberzugs so verbunden ist, daß auf dem ganzen Außenüberzug eine glatte, durchgehende Außenfläche entsteht, wodurch nichts auf das Vorhandensein einer Airbag-Einheit unterhalb des Außenüberzugs hindeutet, wobei der Füllstreifen schwächer ist als die übrigen Bereiche des Außenüberzugs und deshalb sofort zerreiht und eine Öffnung freigibt, wenn der Airbag sich aus der Airbag-Einheit entfaltet.

17. Abdeckungsanordnung nach Anspruch 16, weiterhin enthaltend einen Füllstreifen (40b) aus einem thermoplastischen Material in der vorgeformten Aussparung, wobei der Füllstreifen integral mit den übrigen Bereichen des Außenüberzugs (40a) ausgebildet ist.

18. Abdeckungsanordnung nach Anspruch 16, weiterhin enthaltend einen Füllstreifen (40b) aus einem thermoplastischen Material in der vorgeformten Aussparung, wobei der Füllstreifen aus thermoplastischem Material eine geringere Zugfestigkeit besitzt als der Außenüberzug.

19. Abdeckungsanordnung nach Anspruch 16, weiterhin dadurch gekennzeichnet, daß der Außenüberzug aus einem ersten gegossenen thermoplastischen Material und der Füllstreifen aus einem zweiten thermoplastischen Überzug besteht, der die vorgeformte Öffnung so ausfüllt, daß eine glatte, durchgehende äußere Fläche oberhalb der Airbag-Einheit entsteht.

20. Abdeckungsanordnung nach Anspruch 19, weiterhin umfassend einen Füllstreifen aus einer Materialgruppe, die Polyvinylchloride und Polyolefine umfaßt, in welche Glasfasern eingelagert wurden.

21. Abdeckungsanordnung nach Anspruch 20, weiterhin umfassend einen Füllstreifen aus einer Materialgruppe, die Polyvinylchloride, in die Karbonat eingelagert wurde, und Polyolefine, in welche Glasfasern eingelagert wurden, umfaßt.

Revendications

1. Procédé pour former une peau extérieure (40) d'un ensemble de revêtement (52) pour un dispositif de poche d'air (54), la peau extérieure présentant intérieurement une ligne de rupture correspondant à la forme générale d'une porte ou de portes (64,66) recouvrant la sortie d'un boîtier (70) pour la poche

d'air dans le dispositif de poche d'air, le procédé comprenant :

- a) la fourniture d'une coque de moule (18) comportant une partie de surface interne (34),
 - b) la fourniture d'un joint (30) ayant une forme qui correspond à la forme de la ligne de rupture (58) devant être ménagée dans la peau extérieure (40),
 - c) le placement du joint (30) en contact d'obturation avec la dite partie de surface intérieure (34) pour former une empreinte obturée d'une forme épousant celle de la ligne de rupture (58),
 - d) le dépôt d'un premier matériau thermoplastique (40) dans la surface du moule et contre la périphérie du joint lorsque celui-ci est placé en contact d'obturation avec la surface intérieure, et le chauffage du premier matériau thermoplastique pour former une peau extérieure autour du joint ;
 - e) l'enlèvement du joint hors de la peau extérieure pour former à l'intérieur et à travers elle une ouverture préformée correspondant à la forme de la ligne de rupture ; et
 - f) le remplissage de l'ouverture préformée ménagée dans la peau extérieure par un matériau (40b) ayant des propriétés différentes de celles de la peau extérieure.
2. Procédé pour former une peau extérieure (40) pour un ensemble de revêtement (52) d'un dispositif de poche d'air (54), la peau extérieure comportant, formée intérieurement, une ligne de rupture (58) correspondant à la forme générale d'une porte ou de portes (64,66) recouvrant la sortie d'un boîtier (70) pour la poche d'air dans le dispositif de poche d'air, le procédé comprenant :
- le formage d'une ouverture préformée (40a) correspondant à un modèle de ligne de rupture (58) dans une peau extérieure (40) d'un premier matériau thermoplastique ; et
 - le remplissage de l'ouverture préformée par un second matériau thermoplastique (40b) ayant des propriétés différentes de celles du premier matériau.
3. Procédé selon la revendication 1, comprenant de plus une opération de remplissage (f), dans lequel le remplissage comprend un remplissage de l'ouverture préformée (58) pour former une surface douce ininterrompue transversalement à la peau extérieure selon une ligne de couture intérieure cachée déterminée par le second matériau thermoplastique (40b).
4. Procédé selon la revendication 1, comprenant de plus un remplissage de l'ouverture préformée en

5. pulvérisant un revêtement intérieur en un matériau thermoplastique de remplissage.

5. Procédé selon la revendication 4, comprenant de plus un remplissage de l'ouverture préformée en pulvérisant un revêtement intérieur en un matériau thermoplastique chargé de verre.
10. 6. Procédé selon la revendication 4, comprenant de plus un remplissage de l'ouverture préformée en pulvérisant un revêtement intérieur en un matériau PVC chargé de carbonate.
15. 7. Procédé selon la revendication 2, comprenant de plus une opération de remplissage (f), dans lequel le remplissage comprend un remplissage de l'ouverture pour former une surface douce ininterrompue transversalement à la peau extérieure à l'endroit d'une ligne de couture cachée.
20. 8. Procédé selon la revendication 2, comprenant de plus un remplissage de l'ouverture en pulvérisant un matériau thermoplastique chargé.
25. 9. Procédé selon la revendication 4, comprenant de plus un remplissage de l'ouverture en pulvérisant un revêtement intérieur en un matériau PVC chargé de verre.
30. 10. Procédé selon la revendication 4, comprenant de plus un remplissage de l'ouverture en pulvérisant un revêtement intérieur en un matériau PVC chargé de carbonate.
35. 11. Ensemble de moule pour former une peau extérieure (40) d'un ensemble de revêtement (52) pour un dispositif de poche d'air (54), la peau extérieure présentant une ligne de rupture (58) qui en constitue une partie intégrale correspondant à la forme générale d'une porte ou de portes (64,66) recouvrant la sortie d'un boîtier (70) pour la poche d'air dans le dispositif de poche d'air, le moule comprenant :
40. une mince coque de moule (18) présentant une surface intérieure (34) sur laquelle doit être formée la peau extérieure (40) et une surface extérieure, et une partie obturable sur cette surface intérieure ;
45. un joint (30) sur lequel se trouve une surface qui correspond de façon générale à la forme de la ligne de rupture (54) ; et
50. un chariot de joint (20) mobile sélectivement par rapport à la dite surface intérieure pour comprimer le dit joint contre la partie obturable de la dite surface intérieure pour former sur la dite surface intérieure une empreinte du joint obturée correspondant à la forme de la sortie du boîtier.

12. Ensemble de moule selon la revendication 11, comprenant de plus une boîte à poudre (12) conçue pour être reliée à la dite coque de moule mince et comprenant une surface intérieure qui se combine à la surface intérieure de la dite coque de moule mince pour former une chambre fermée ; le dit chariot de joint (20) étant relié de façon fixe à la dite boîte à poudre et s'étendant vers l'extérieur de celle-ci et vers l'intérieur du dit moule creux mince jusqu'à un point peu écarté de la dite partie obturable de la dite surface interne de la dite coque de moule mince ; ledit joint (30) étant relié au dit chariot de joint pour relier la dite boîte à poudre et la dite partie obturable de la dite surface interne pour former sur celle-ci une empreinte fermée.
13. Ensemble de moule selon la revendication 11, comprenant de plus un joint (30) dont une partie creuse est d'une profondeur supérieure quand elle est au repos plutôt que quand elle est engagée par la dite partie obturable de la dite surface intérieure (32).
14. Dispositif de moule selon la revendication 12, comprenant de plus un joint (30) qui est compressible quand il est engagé par la dite surface intérieure à la suite de la liaison de la dite boîte à poudre (12) avec la dite partie obturable de la dite coque de moule mince.
15. Ensemble de moule selon la revendication 14, comprenant de plus un joint (30) dont une section creuse est d'une profondeur supérieure quand elle est au repos que quand elle est engagée par la dite partie obturable de la dite surface interne.
16. Ensemble de revêtement (52) pour un dispositif de poche d'air (54) déployable dans l'habitacle d'un véhicule à moteur à travers une ouverture ménagée dans l'ensemble de revêtement à l'endroit d'une ligne de rupture séparable cachée (58) ménagée dans l'ensemble de revêtement, le perfectionnement comprenant :

une peau extérieure (40) présentant une surface extérieure douce ;
 un moyen (58) formant une ouverture préformée dans la dite peau extérieure ; la dite ouverture préformée ayant une épaisseur correspondant à celle de ce qui reste de la peau extérieure et ayant une forme épousant la sortie du dispositif de poche d'air ;
 et une bande de remplissage (40b) disposée à l'intérieur de la dite ouverture préformée, liée de façon intégrale à la dite peau extérieure (40) et ayant une surface extérieure qui rejoint la surface extérieure de la peau extérieure pour former une surface extérieure douce ininterrompue s'étendant transversalement à la totalité de la peau extérieure, de sorte qu'il n'y a

- 5 pas d'indication de la présence d'un dispositif de poche d'air sous la peau extérieure ; la dite bande de remplissage étant plus faible que le reste de la dite peau extérieure, de façon qu'elle se sépare immédiatement pour former une ouverture lors du déploiement de la poche d'air depuis le dispositif de poche d'air.
- 10 17. Ensemble de revêtement selon la revendication 16, comprenant de plus une bande de remplissage (40b) en un matériau thermoplastique placée dans la dite ouverture préformée, la dite bande de remplissage étant moulée d'une seule pièce avec le reste de la peau extérieure (40a).
- 15 18. Ensemble de revêtement selon la revendication 16, comprenant de plus une bande de remplissage en matériau thermoplastique qui remplit l'ouverture préformée ; la dite bande de remplissage en matériau thermoplastique présentant une limite élastique moindre que celle de la dite peau extérieure.
- 20 19. Ensemble de revêtement selon la revendication 16, comprenant de plus le fait que la dite peau extérieure est constituée en un premier matériau thermoplastique moulé, et que la dite bande de remplissage est constituée par une seconde peau extérieure thermoplastique qui remplit l'ouverture préformée pour former une surface extérieure douce ininterrompue recouvrant le dispositif de poche d'air.
- 25 20. Ensemble de revêtement selon la revendication 19, comprenant de plus une bande de remplissage constituée en un matériau choisi dans le groupe comprenant le chlorure de polyvinyle chargé de verre ou les polyoléfines chargées de verre.
- 30 21. Ensemble de revêtement selon la revendication 20, comprenant de plus une bande de remplissage constituée en un matériau choisi dans le groupe comprenant le chlorure de polyvinyle chargé de carbonate ou les polyoléfines chargées de verre.
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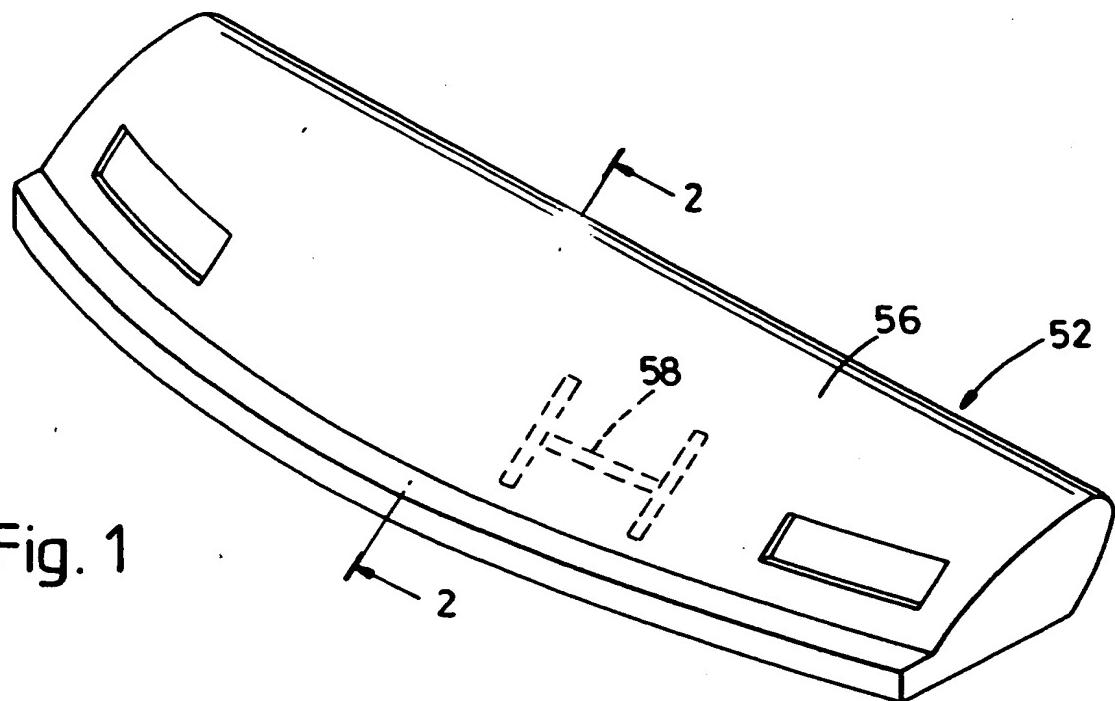


Fig. 1

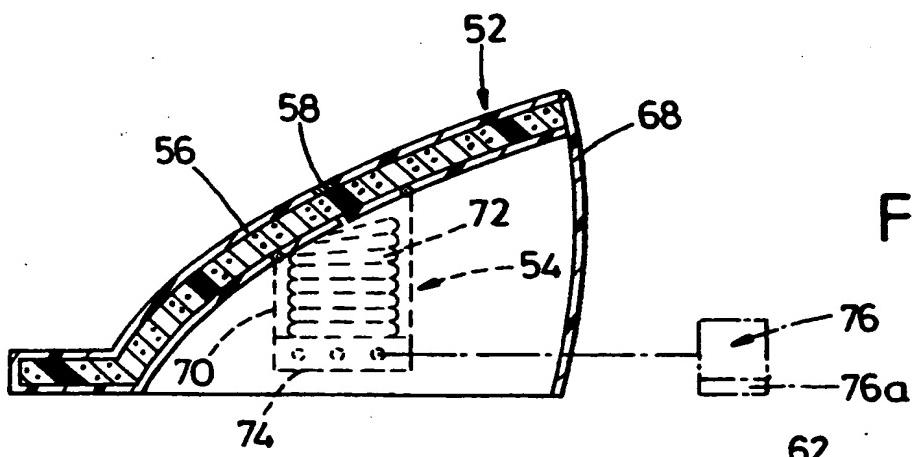


Fig. 2

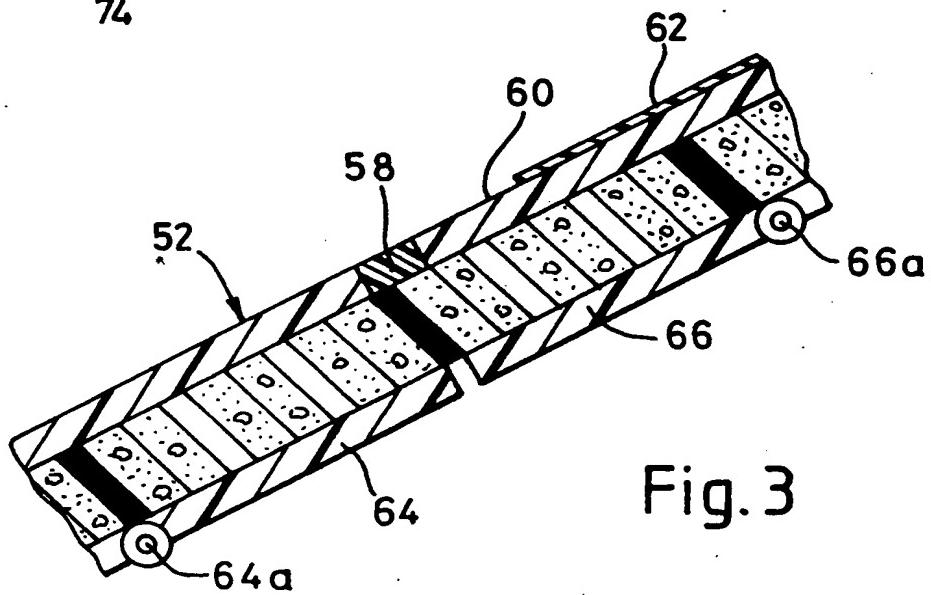


Fig. 3

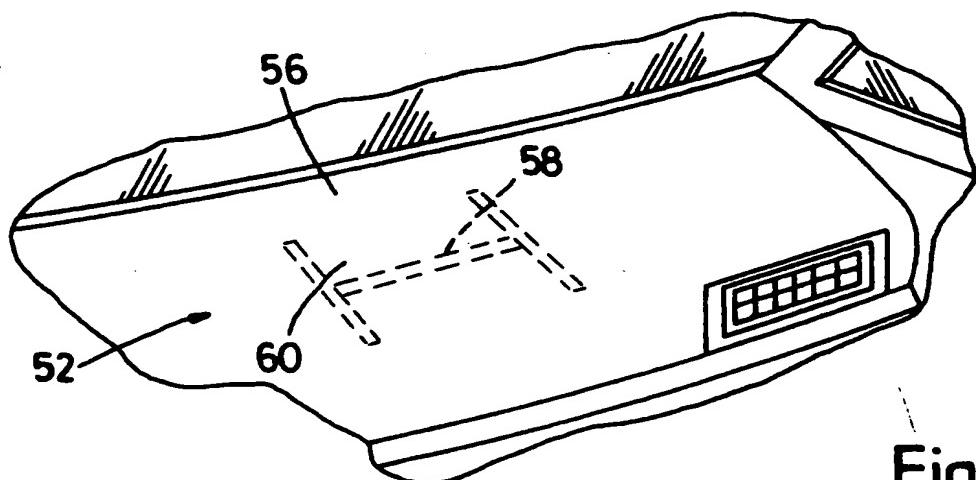


Fig. 4

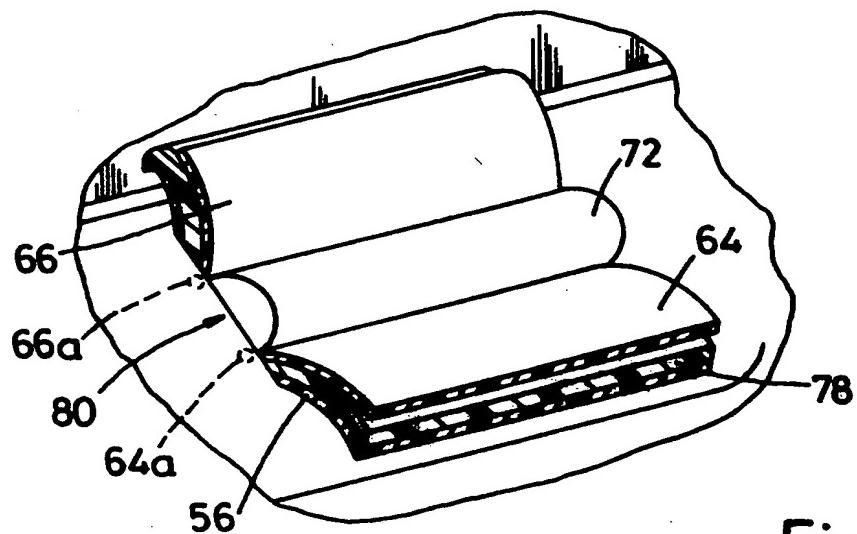


Fig. 5

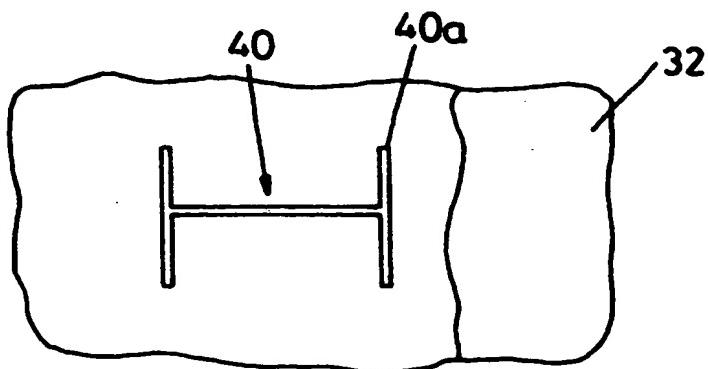


Fig. 6

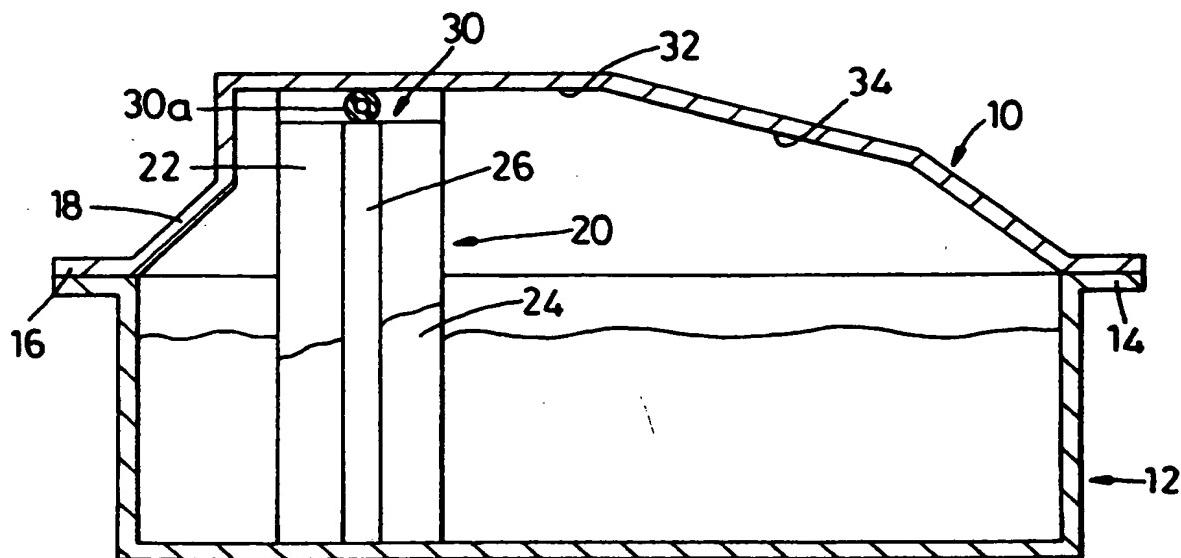


Fig. 7

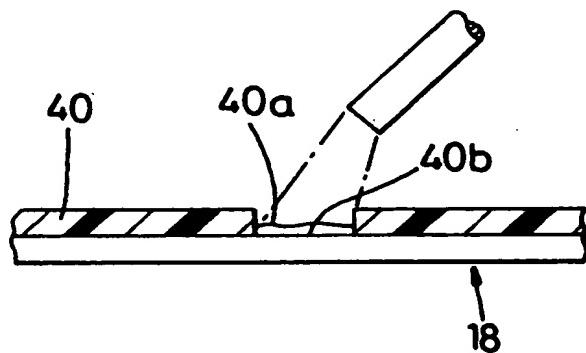


Fig. 8

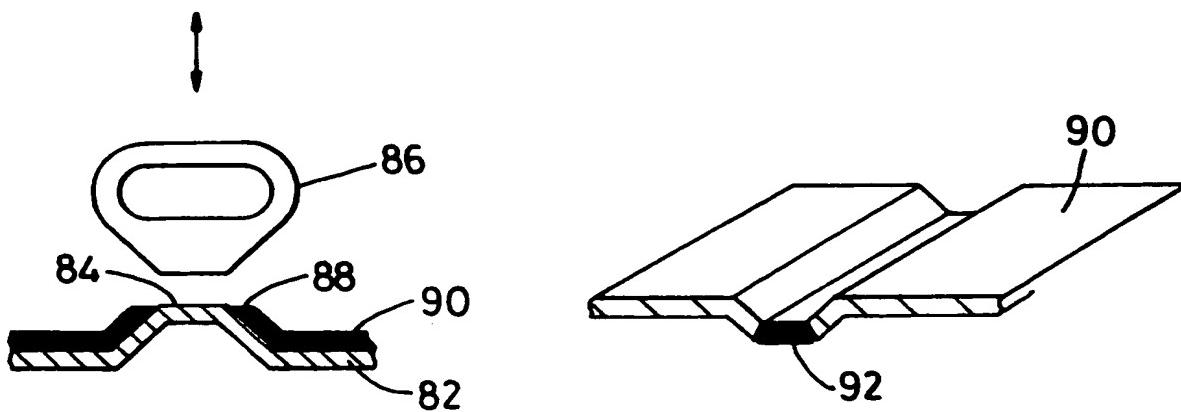


Fig. 9

Fig. 10

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